

**GAUTENG DEPARTMENT OF EDUCATION
GAUTENGSE DEPARTEMENT VAN ONDERWYS**

**SENIOR CERTIFICATE EXAMINATION
SENIORSERTIFIKAAT-EKSAMEN**

POSSIBLE ANSWERS FOR / **TECHNIKA ELECTRONICS SG**
MOONTLIKE ANTWOORDE VIR : **TECHNIKA ELEKTRONIKA SG**

QUESTION / VRAAG 1

$$Z = \sqrt{(X_L - X_C)^2 + R^2}$$

ELEKTRIESE STROOMTHEORIE
ELECTRICAL CURRENT THEORY.

$$X_C = \frac{1}{2\pi f C} \quad \checkmark$$

$$= \frac{1}{2\pi \times (1 \times 10^3) \times (1 \times 10^{-6})} \quad \checkmark$$

$$= 159,15 \, \Omega \quad \longrightarrow \quad \checkmark \quad (3)$$

$$X_L = 2\pi f L \quad \checkmark$$

$$= 2\pi \times (1 \times 10^3) \times (10 \times 10^{-3}) \quad \checkmark$$

$$= 62,83 \, \Omega \quad \longrightarrow \quad \checkmark \quad (3)$$

1.1

$$Z = \sqrt{(X_C - X_L)^2 + R^2} \quad \checkmark$$

$$= \sqrt{(96,32)^2 + (100)^2} \quad \checkmark$$

$$= 138,84 \, \Omega \quad \longrightarrow \quad \checkmark \quad (3)$$

$$X_C - X_L = 159,15 \, \Omega - 62,83 \, \Omega \quad \checkmark$$

$$= 96,32 \, \Omega \quad \longrightarrow \quad \checkmark \quad (2)$$

1.2

$$I_T = \frac{V_T}{Z} \checkmark$$

$$= \frac{100 \text{ V}}{138,84 \Omega} \checkmark$$

$$= \underline{\underline{720,25 \text{ mA}}} \longrightarrow \textcircled{3}$$

1.3

$$V_C = I_T \times X_C \checkmark$$

$$= 720,25 \text{ mA} \times 159,15 \Omega \checkmark$$

$$= \underline{\underline{114,63 \text{ Volt}}} \longrightarrow \textcircled{3}$$

1.4

$$V_L = I_T \times X_L \checkmark$$

$$= 720,25 \text{ mA} \times 62,83 \Omega \checkmark$$

$$= \underline{\underline{45,25 \text{ Volt}}} \longrightarrow \textcircled{3}$$

1.5

$$V_R = I_T \times R \checkmark$$

$$= 720,25 \text{ mA} \times 100 \Omega \checkmark$$

$$= \underline{\underline{72,03 \text{ Volt}}} \longrightarrow \textcircled{3}$$

1.6

$$\begin{aligned} \cos \phi &= \frac{R}{Z} \quad \checkmark \\ &= \frac{100 \Omega}{138,84 \Omega} \quad \checkmark \\ &= 43,92^\circ \quad \checkmark \end{aligned} \quad \textcircled{3}$$

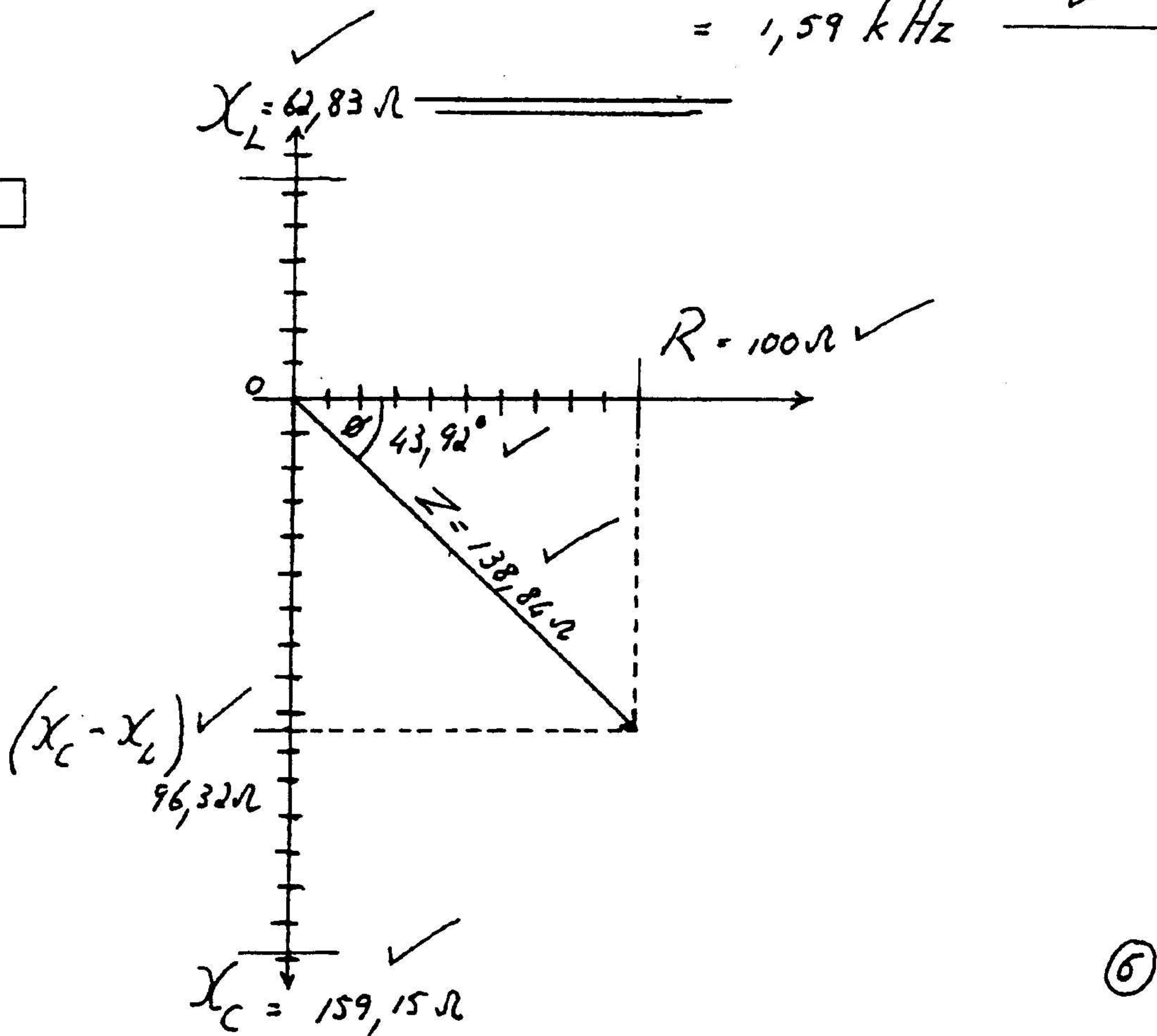
1.7

RESONANTE FREQUENZIE: $f_r = \frac{1}{2\pi\sqrt{LC}} \quad \checkmark$

$$= \frac{1}{2\pi\sqrt{(1 \times 10^{-6}) \times (10 \times 10^{-3})}} \quad \checkmark$$

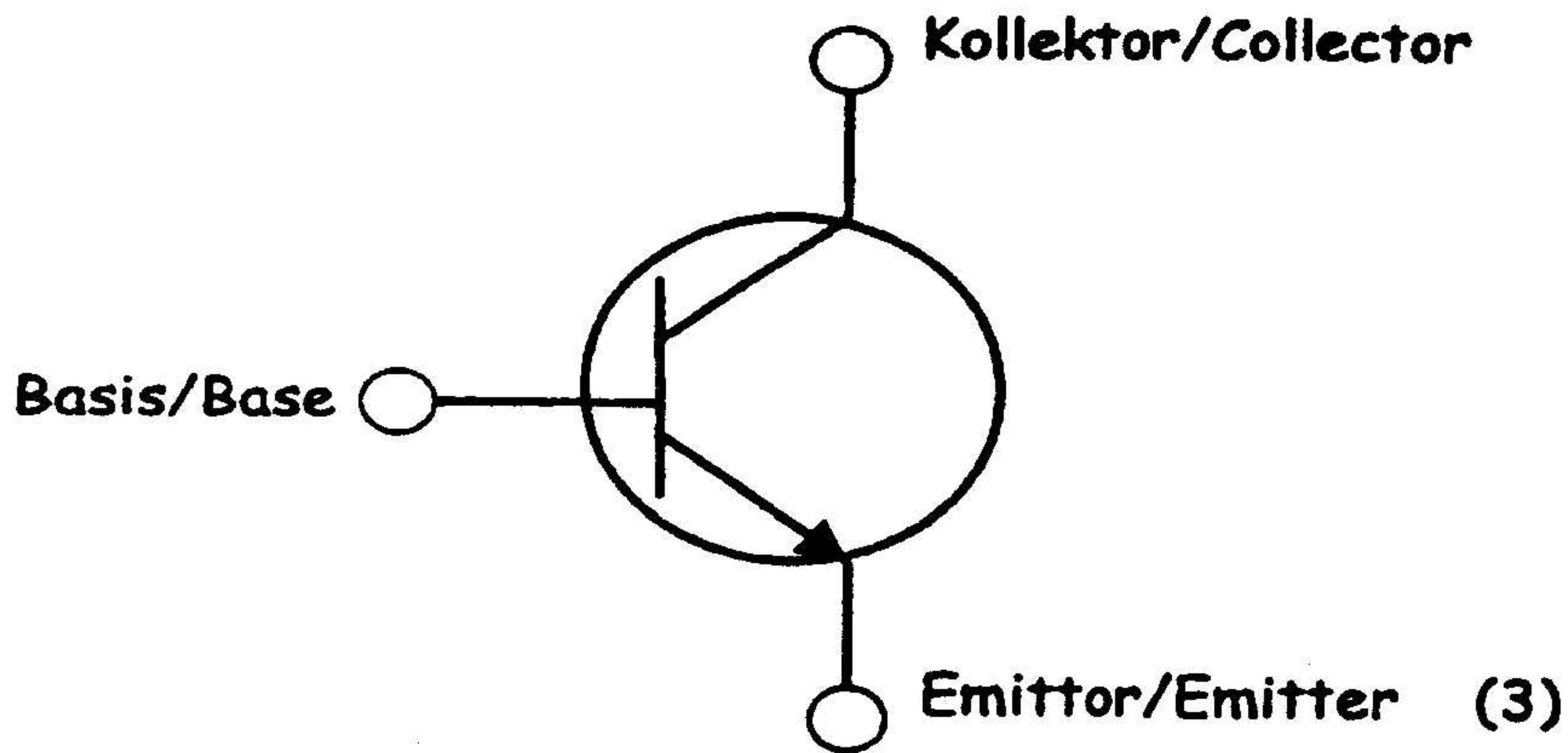
$$= 1,59 \text{ kHz} \quad \checkmark \quad \textcircled{3}$$

1.8

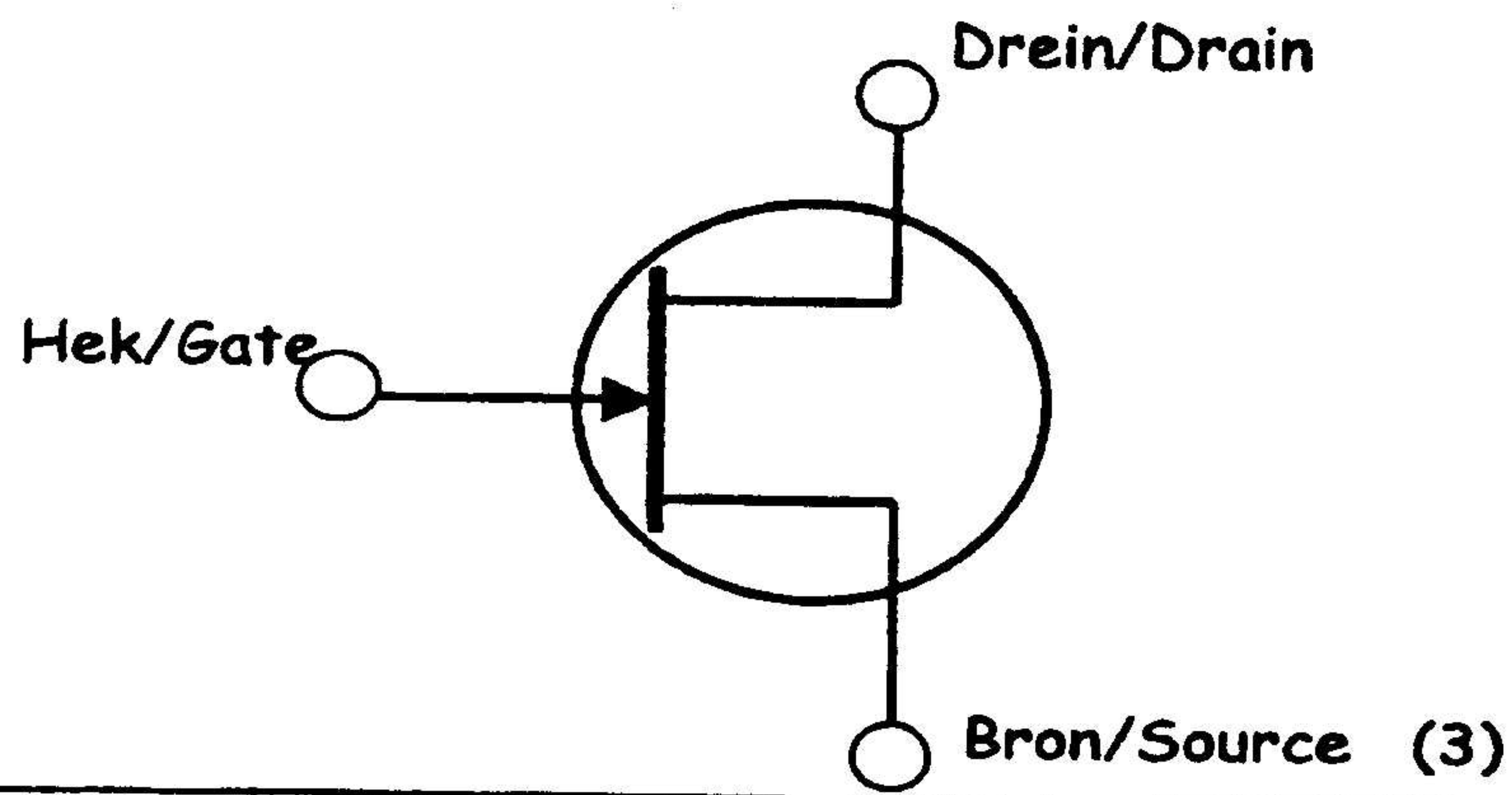


QUESTION / VRAAG 2
SEMICONDUCTOR DEVICES / HALFGELEIERKOMPONENTE

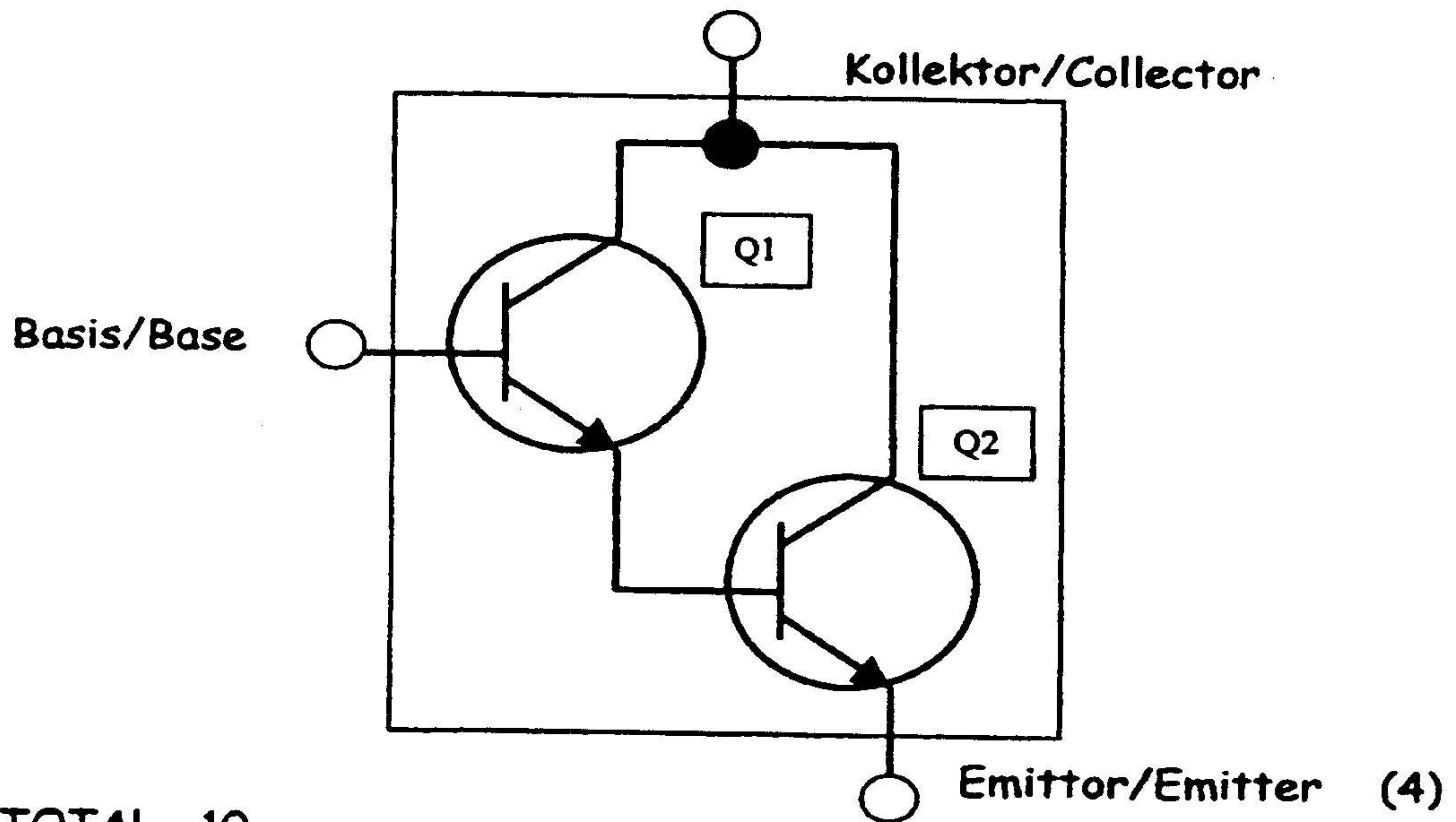
(2.1)



(2.2)



(2.3)



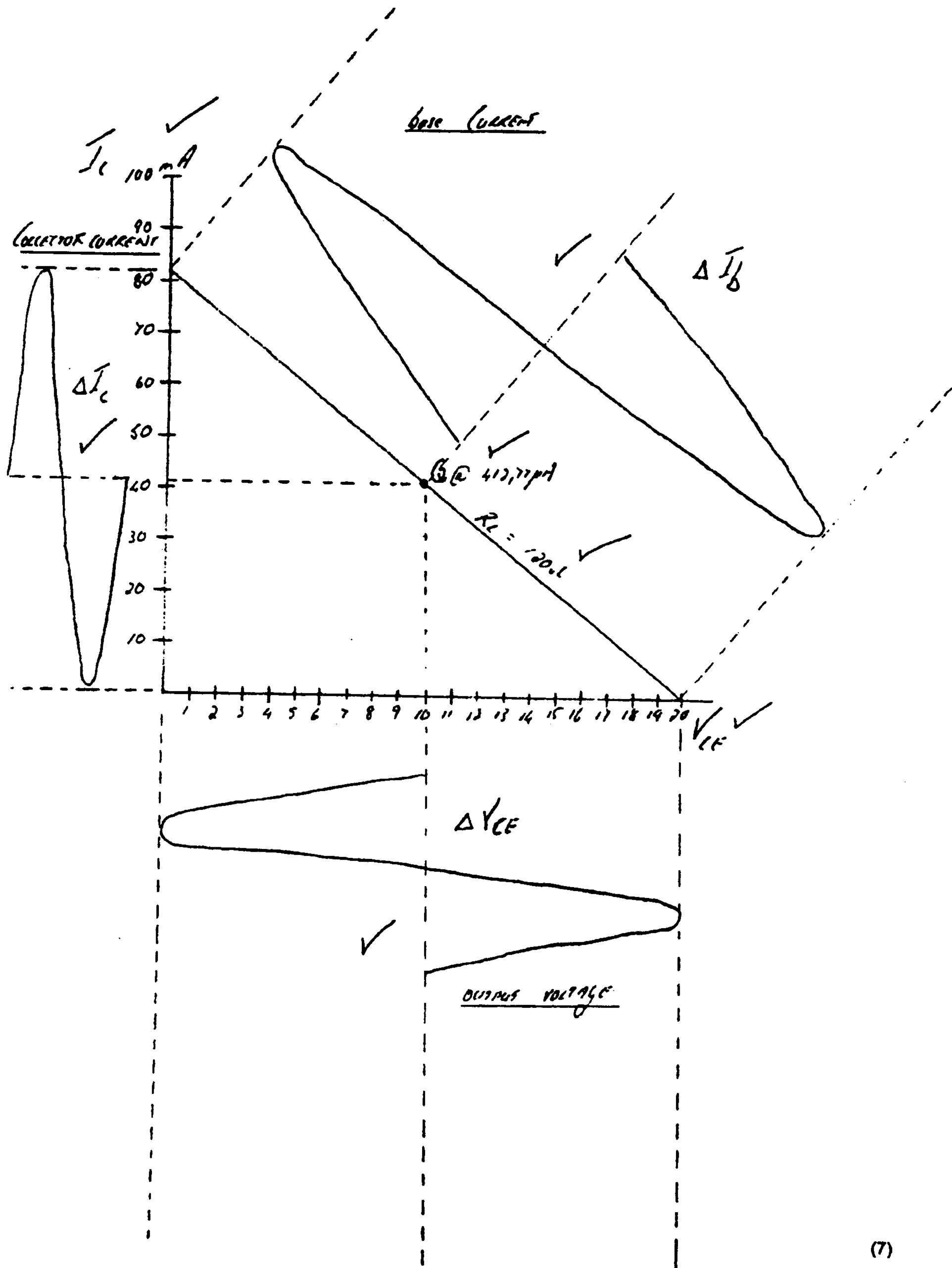
TOTAAL /TOTAL 10

QUESTION / VRAAG 3.1

$$\begin{aligned}
 (a) I_B &= \frac{V_{CC} - V_{BE}}{R_B} \quad \checkmark \\
 &= \frac{20V - 0,6V}{(47 \times 10^3)\Omega} \quad \checkmark \\
 &= (412,77 \times 10^{-6}) \text{ Amp. of } 412,77 \mu\text{A.} \quad \checkmark \rightarrow \textcircled{3}
 \end{aligned}$$

$$\begin{aligned}
 (b) I_C &= I_B \times \beta \quad \checkmark \\
 &= (412,77 \times 10^{-6}) \times 200 \quad \checkmark \\
 &= (82,55 \times 10^{-3}) \text{ Amp. of } 82,55 \text{ mA.} \quad \checkmark \rightarrow \textcircled{3}
 \end{aligned}$$

$$\begin{aligned}
 (c) R_L &= \frac{V_{RL}}{I_C} \quad \checkmark \\
 &= \frac{10V}{(82,55 \times 10^{-3}) \text{ Amp.}} \quad \checkmark \\
 &= 120 \Omega \quad (121,44 \Omega) \quad \checkmark \rightarrow \textcircled{3}
 \end{aligned}$$



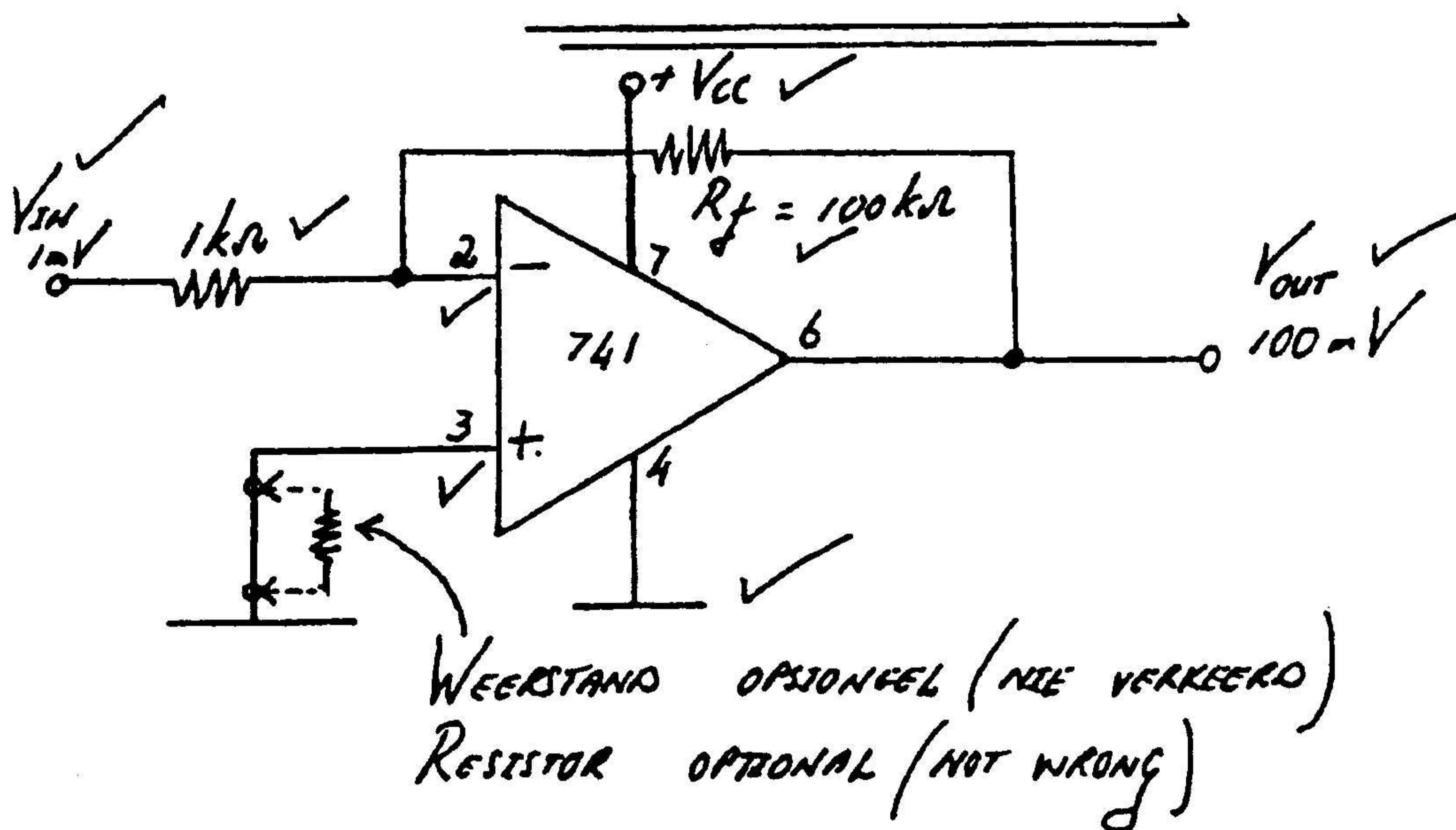
(7)

3.2. $A_v = \frac{R_f}{R_{IN}} \checkmark$

$$R_f = A_v \times R_{IN} \checkmark$$

$$= 100 \times (1 \times 10^3) \Omega \checkmark$$

$$= 100 \text{ k}\Omega \text{ or } (100 \times 10^3) \Omega \checkmark \rightarrow \textcircled{4}$$

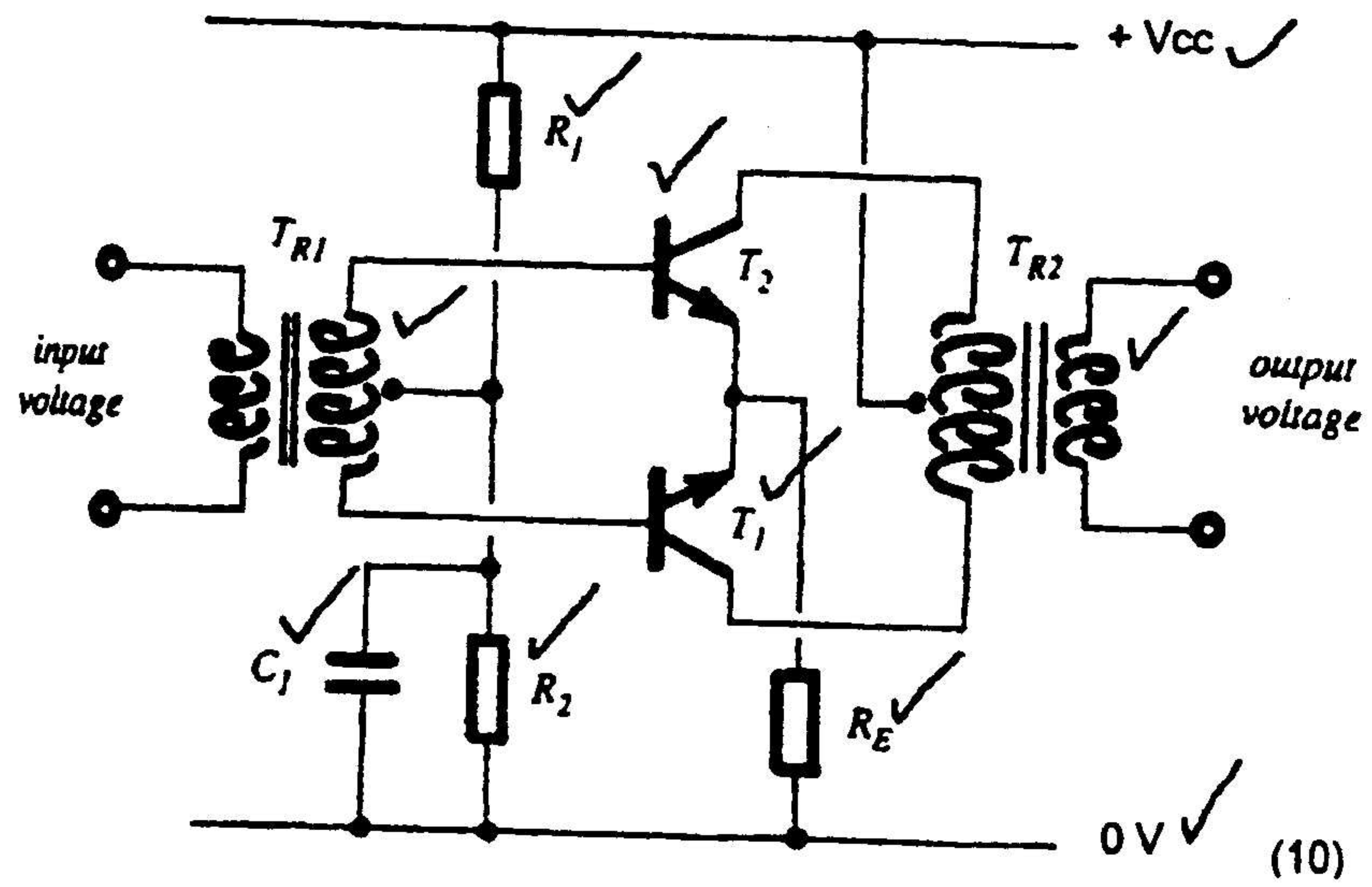


- 3.3
- It improves stability.
Dit verbeter stabiliteit.
 - Increases bandwidth
Verhoog die bandwydte
 - Enhances the input and output impedances of the amplifier
Verbeter die versterker se inset en uitset impedansies
 - Reduces any noise produced within the amplifier
Onderdruk interne geraas

Disadvantage / Nadeel The overall output gain is reduced by introducing a feedback signal.
Die uitsetwinst word verswak deur die terugvoer van 'n sein.

(5)

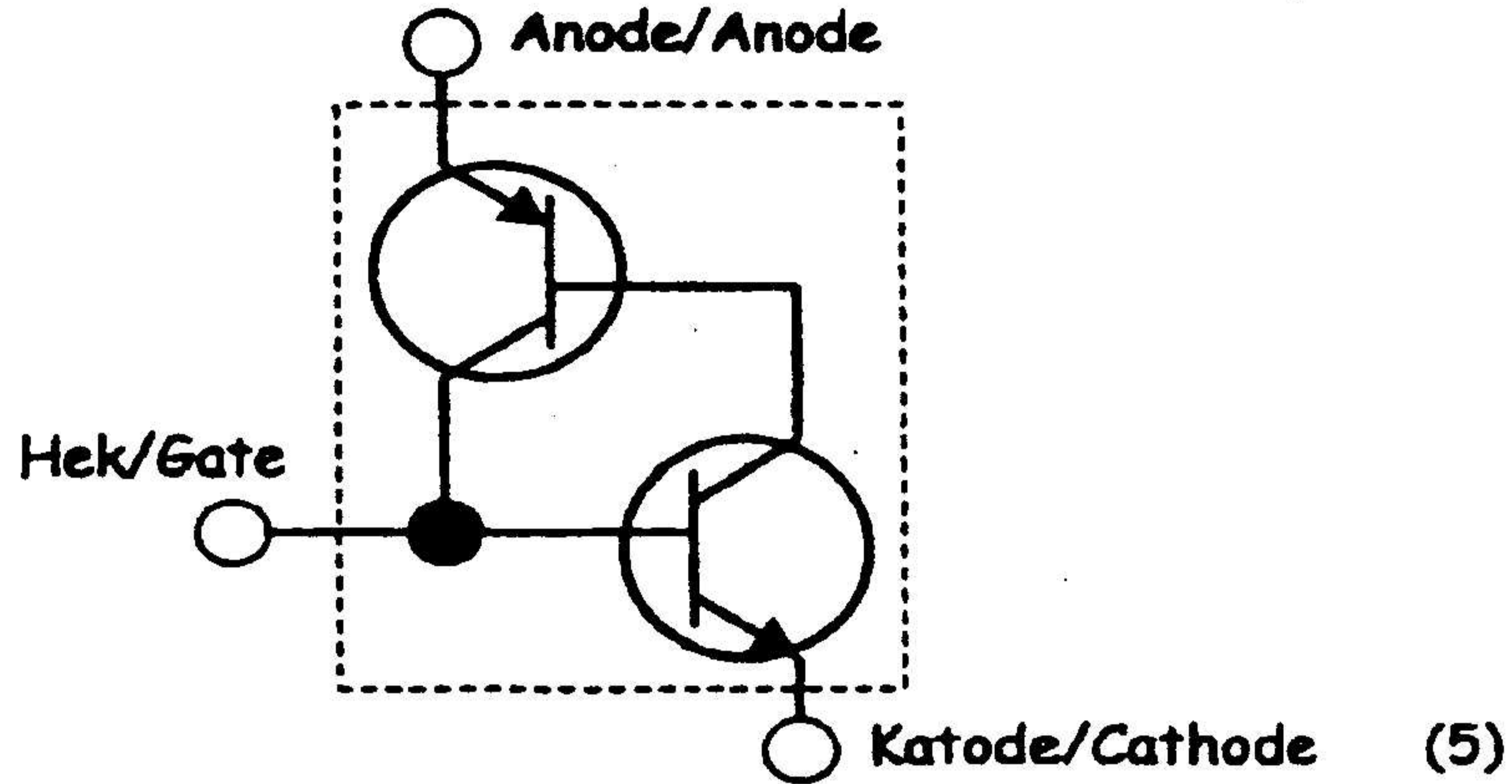
3.4 Symmetrical push-pull pair-class AB amplifier.
 Simetriese klas AB druk-trekversterker



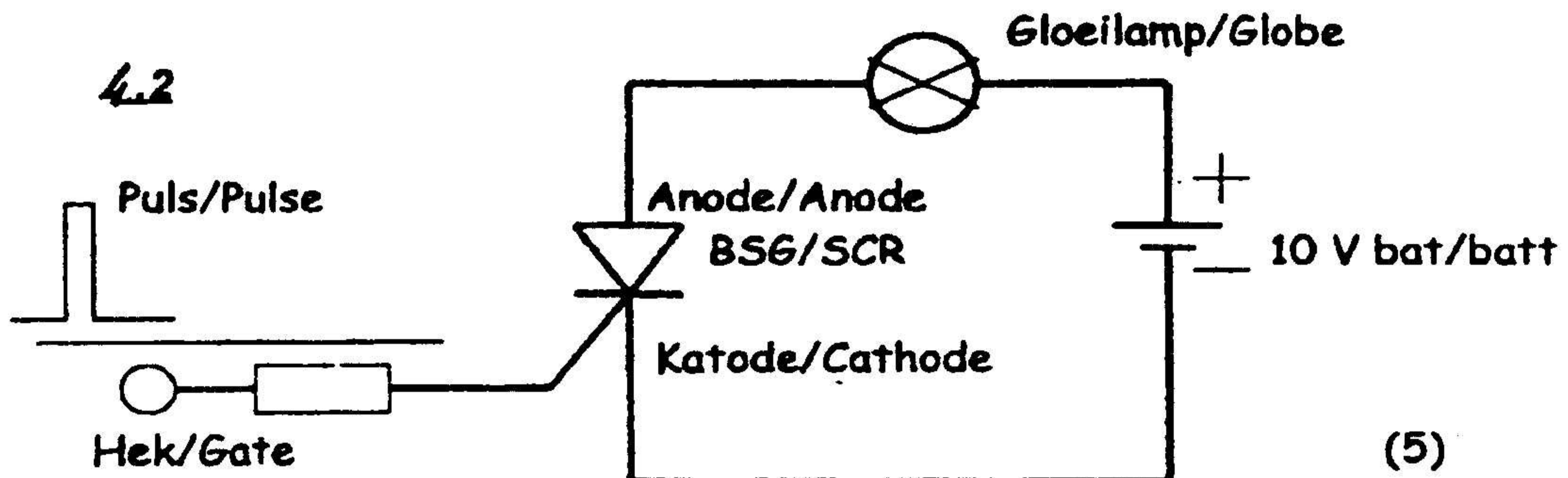
QUESTION / VRAAG 4

Skakel en Beheerbane/ Switching and control circuit

4.1



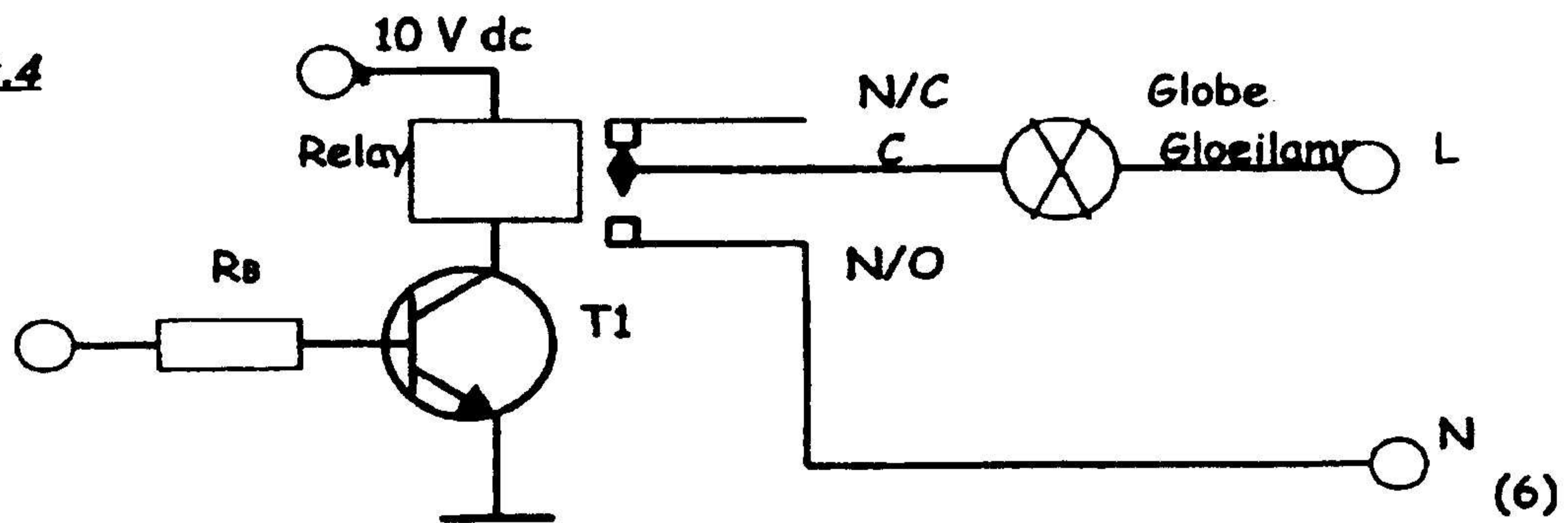
4.2



4.3

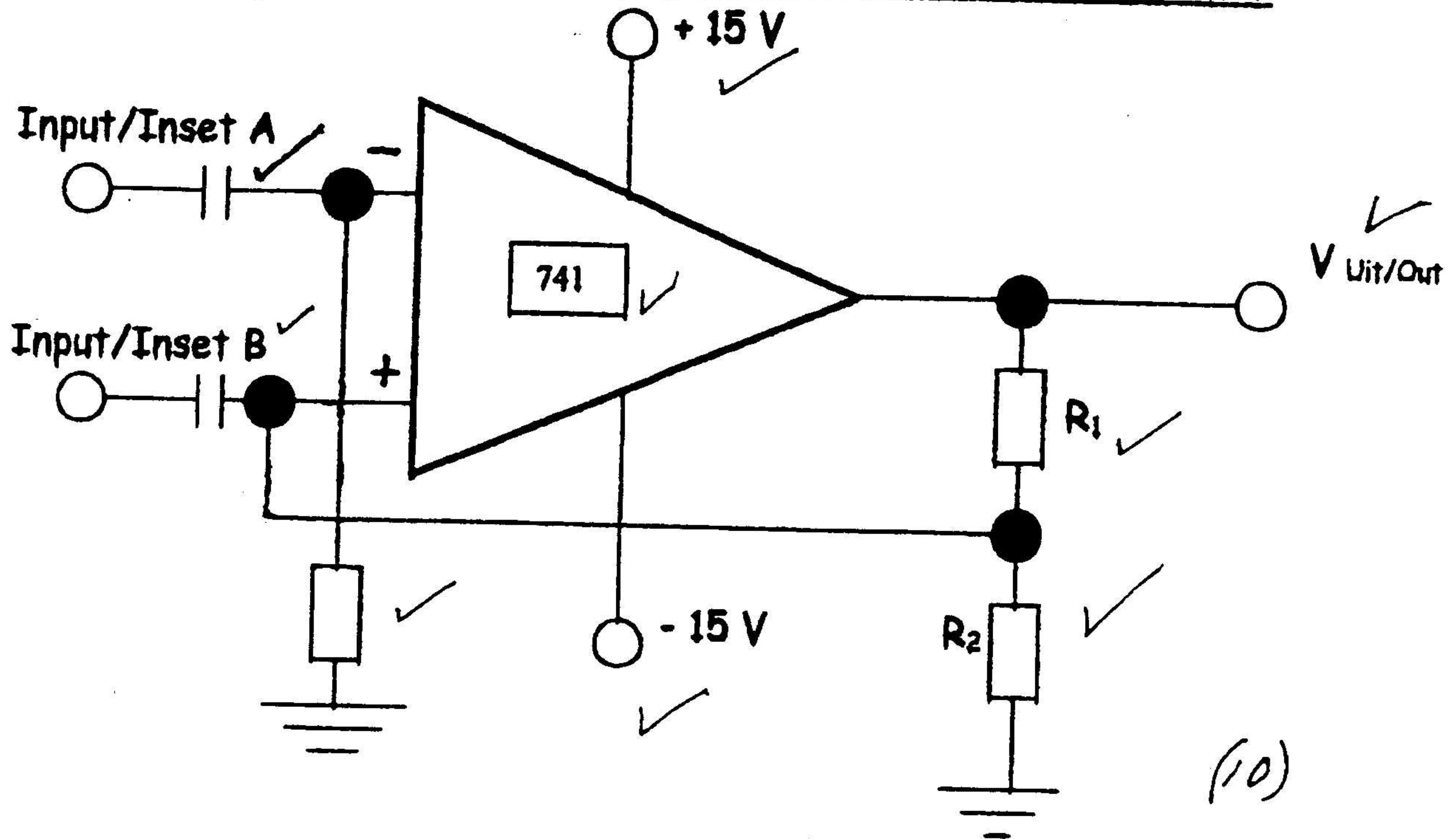
- 1/ Daar moet 'n positiewe puls op die hek aangelê word.
A positive pulse must be connected to the gate.
- 2/ Die anode moet positief t.o.v. die katode wees.
The anode must be positive with respect to the cathode.
- 3/ Die houstrom moet aan die vervaadiger se vereistes voldoen. (3)
The current between the anode & cathode must be above the holding current.

4.4



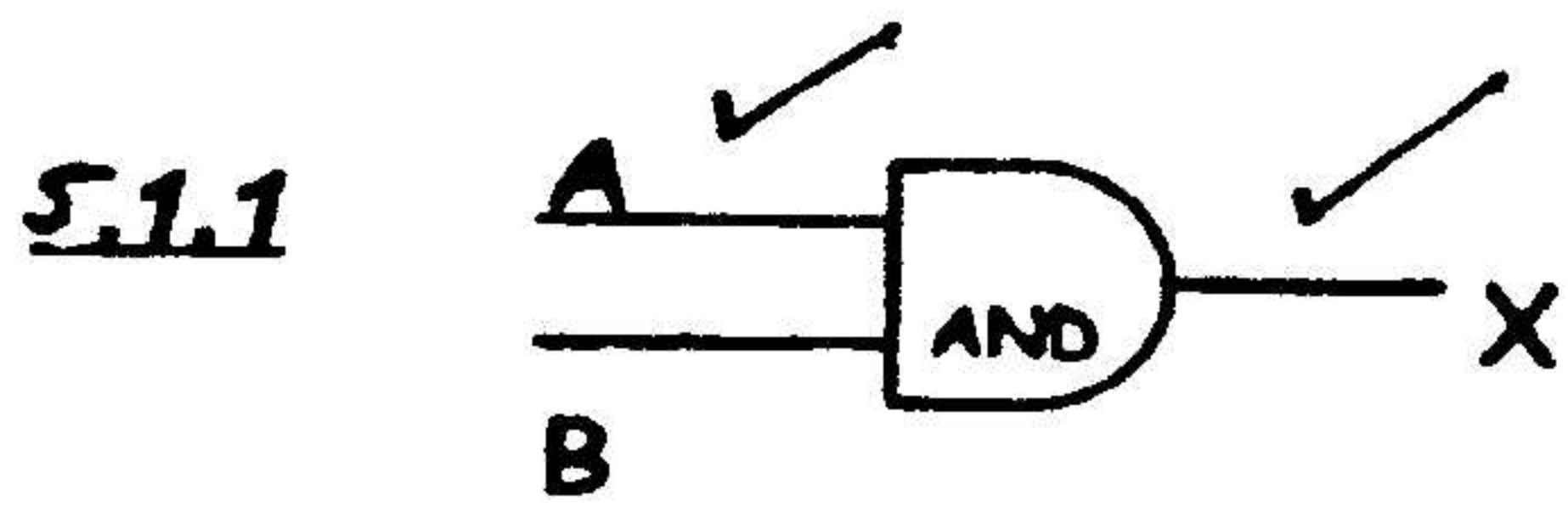
4.5 Tussen 0.6 en 0.7 V (1)
Between 0.6 and 0.7 V

4.6 Bi-stabile Multivibrator/ Bistable Multivibrator



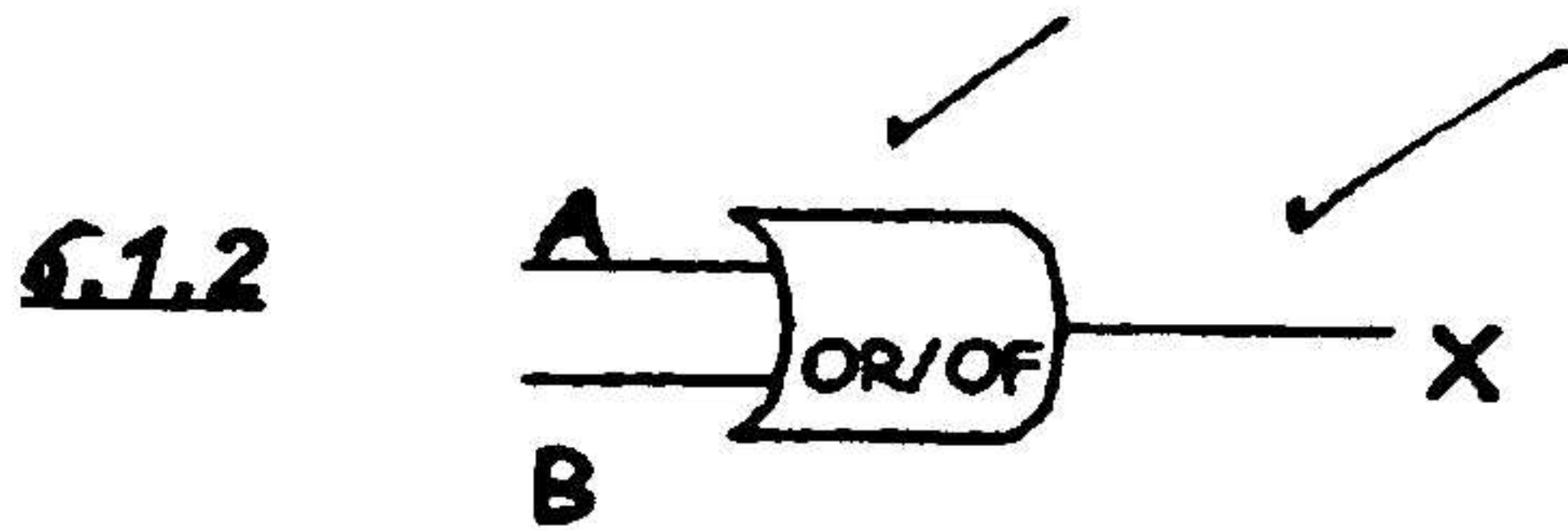
(10)

QUESTION / VRAAG 5.1



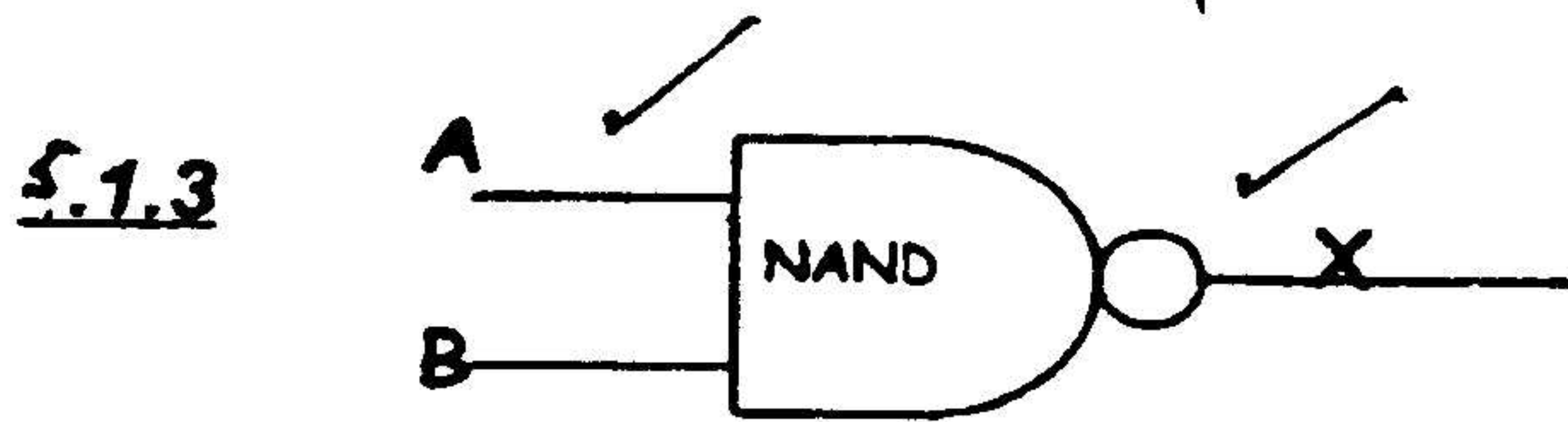
A	B	X
0	0	0
0	1	0
1	0	0
1	1	1

(6)



A	B	X
0	0	0
0	1	1
1	0	1
1	1	1

(6)

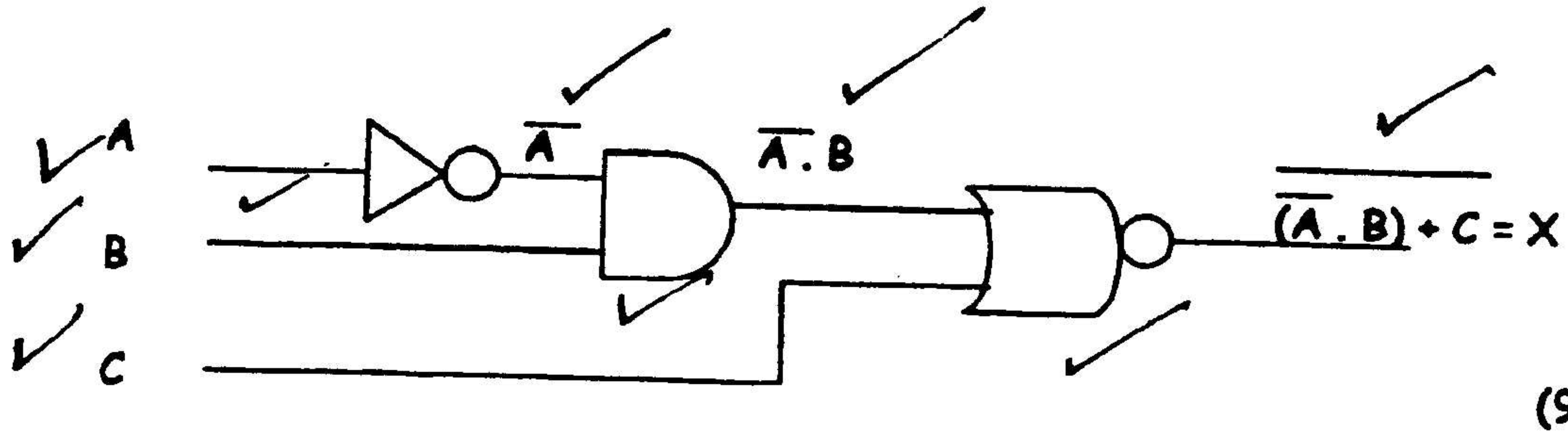


A	B	X
0	0	1
0	1	1
1	0	1
1	1	0

(6)

(18)

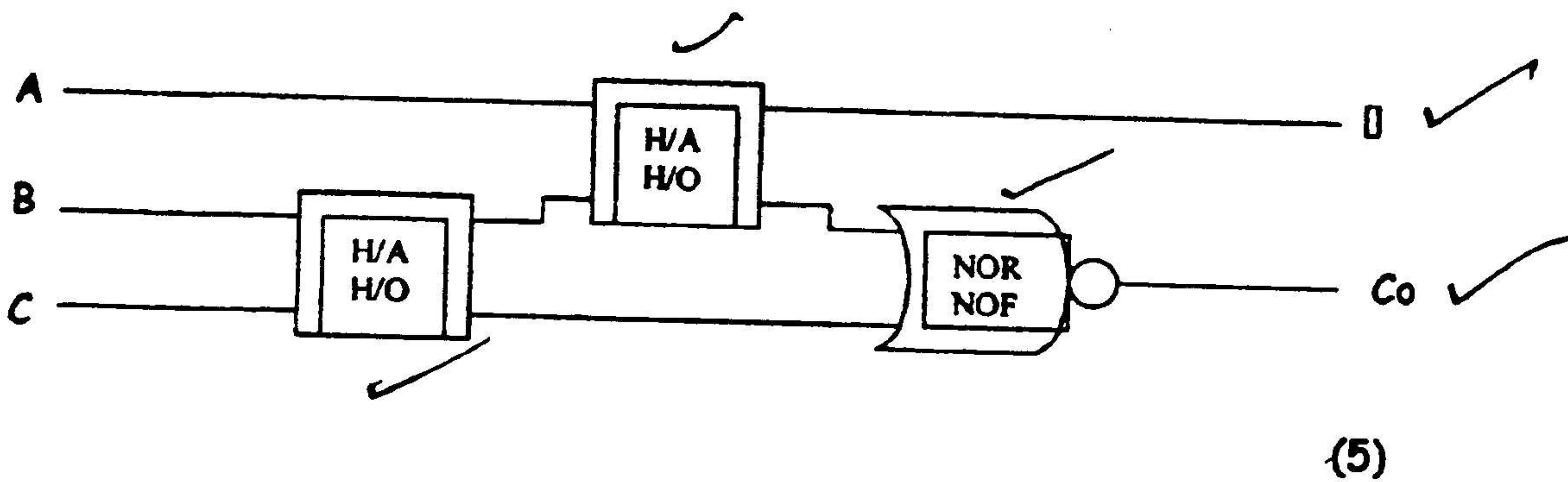
QUESTION / VRAAG 5.2



C	B	A	\bar{A}	$\bar{A}.B$	X
0	0	0	1	0	1
0	0	1	0	0	1
0	1	0	1	1	0
0	1	1	0	0	1
1	0	0	1	0	0
1	0	1	0	0	0
1	1	0	1	1	0
1	1	1	0	0	0

(8)

QUESTION / VRAAG 5.3

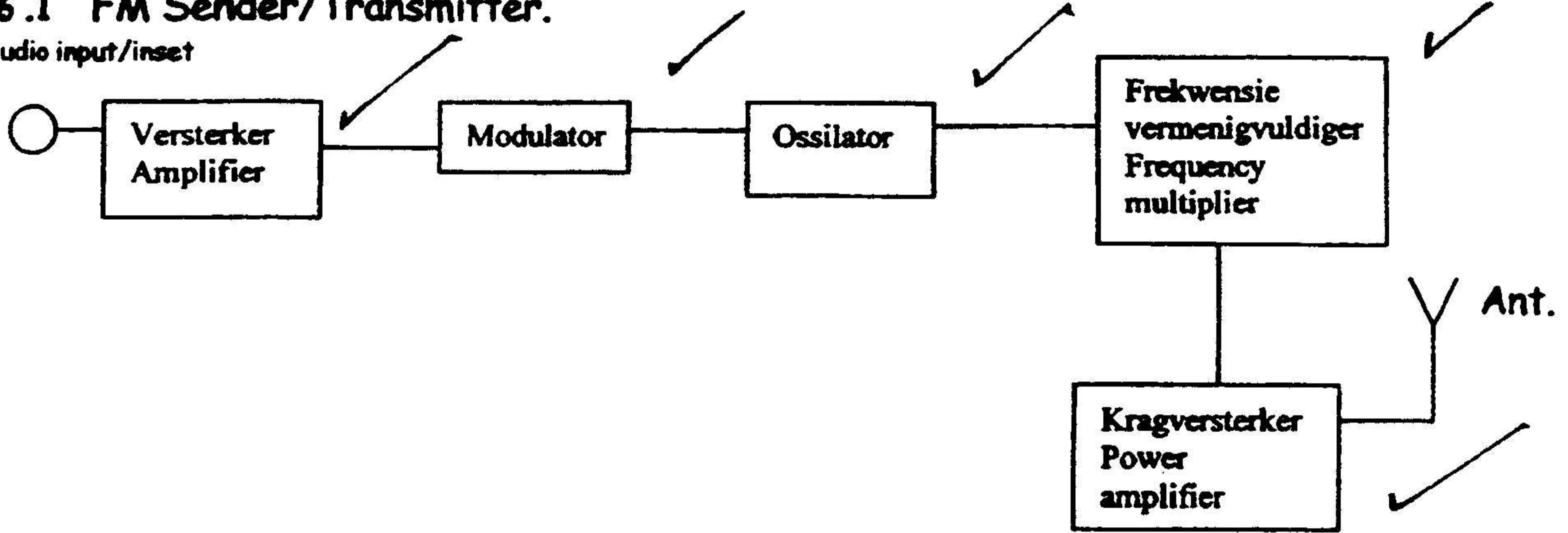


Totaal/Total 40

QUESTION / VRAAG 6.1

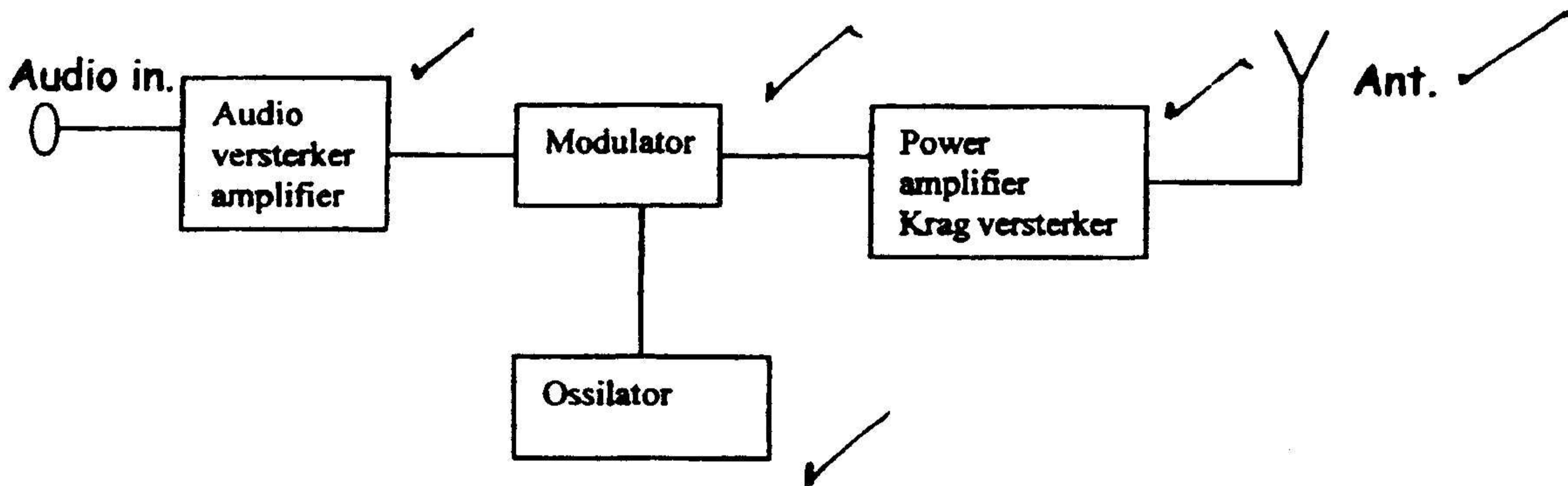
6.1 FM Sender/Transmitter.

Audio input/inset



(5)

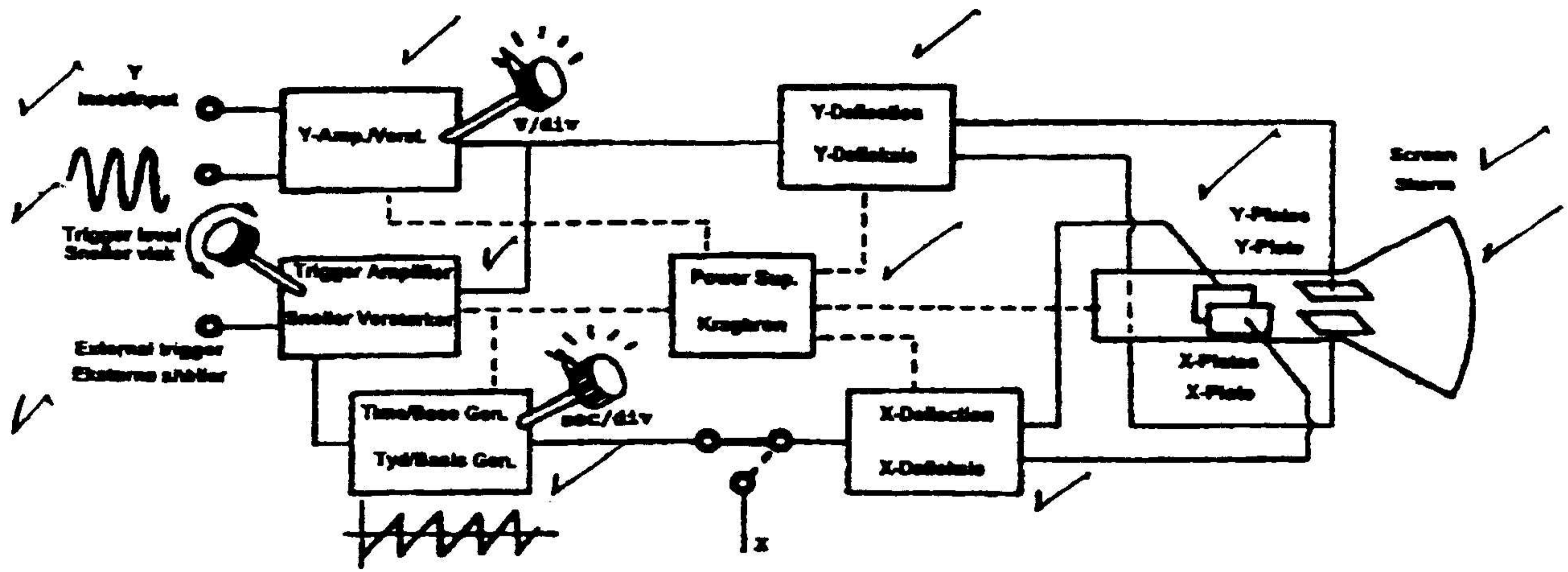
6.2 AM Sender/Transmitter.



(5)

TOTAAL/TOTAL 10

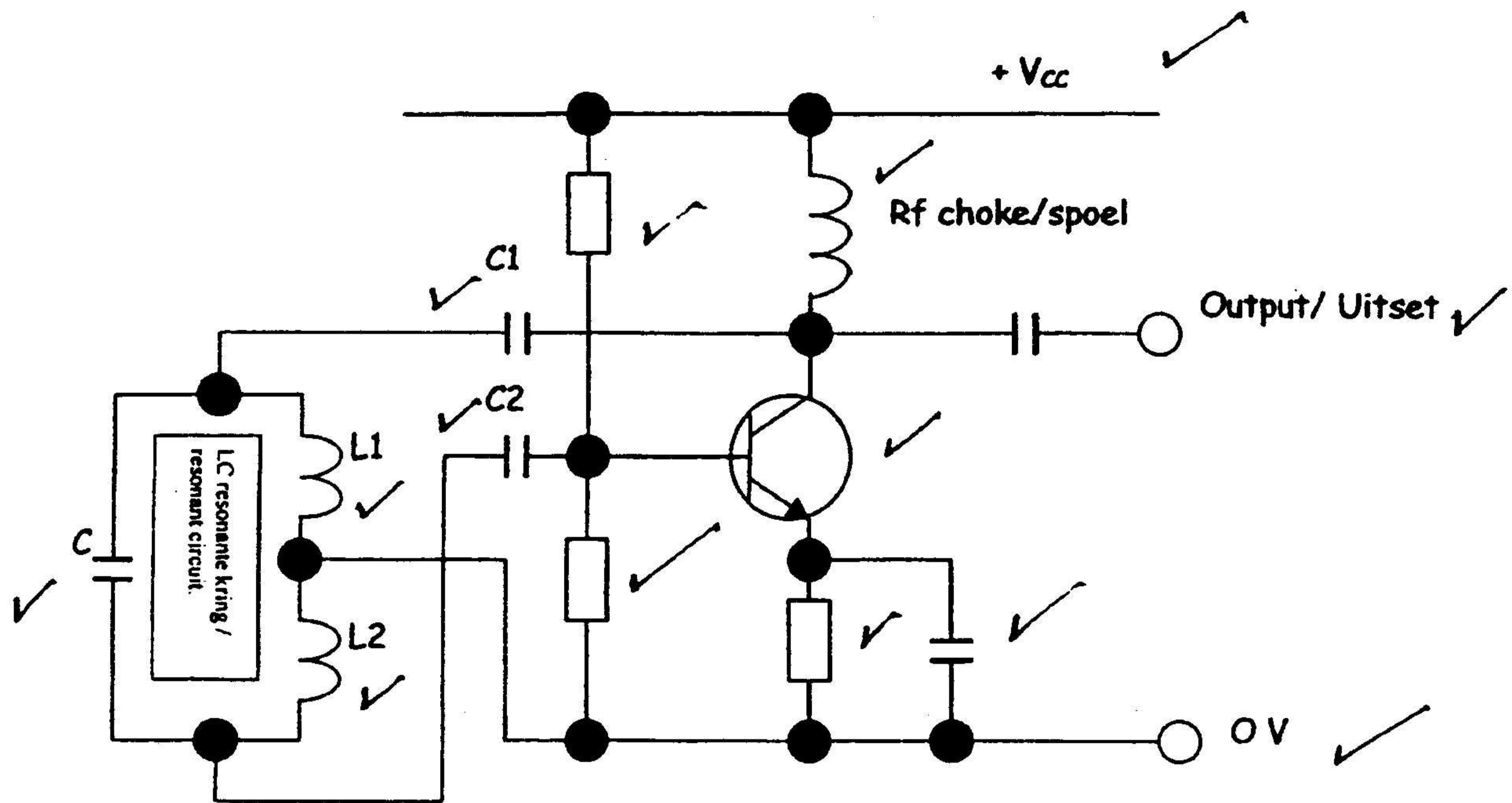
QUESTION / VRAAG 7
OSCILLOSCOPE / OSSILOSKOOP



TOTAAL/TOTAL 12

(12)

QUESTION / VRAAG 8
THE HARTLEY OSCILLATOR / DIE HARTLEY OSSILLATOR



TOTAAL/TOTAL 14

QUESTION / VRAAG 9

- 9.1 False / *Onwaar* (1)
- 9.2 False / *Onwaar* (1)
- 9.3 True / *Waar* (1)
- 9.4 False / *Onwaar* (1)

TOTAL / TOTAAL: (4)**TOTAL / TOTAL: 200**